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METHOD, APPARATUS, AND COMPUTER-READABLE MEDIUM FOR  
INTEGRATING ONLINE AND OFFLINE COMMERCE

FIELD OF THE INVENTION

5           This invention relates to commerce which is, at least in part, electronic commerce, and more particularly, to methods, apparatus and computer-readable media for facilitating internet-based purchases.

BACKGROUND OF THE INVENTION

10           Over the past several years, the global internet and associated technologies have revolutionized the way in which a business is able to engage in transactions with customers. The World Wide Web portion of the internet has made it cost-effective for businesses to reach a larger audience of potential customers and more convenient for customers to shop at their leisure. Businesses can, using internet-based product  
15 advertisements disseminated across multiple web sites, provide a vehicle for a customer to "click through" to a spot on the business's web site where a purchase can be consummated instantly. Security technology has advanced sufficiently to allow customers to trust their ability to make purchases using a credit card. Further, the internet allows businesses to remove logistical barriers to a customer's purchase, by  
20 enabling customers 24-hour access to products, and by eliminating the need for customers to travel to the business's physical location.

          Despite appearances, however, internet-based commerce has in many respects made transactions more difficult. From the seller's standpoint, most retail web sites require multi-tiered system architectures involving numerous hardware and software  
25 components, and presenting a unified face to the customer requires the complex integration of mission-critical but heterogeneous applications like those involved in marketing, inventory management, payment processing and order fulfillment. For some customers, too, internet-based transactions are more difficult in that they place restrictions on method of payment (usually requiring a credit card, and not accepting gift  
30 certificates, exchange credits, cash or checks), and require that the customer wait for goods to be shipped or services to be rendered.

          These technological and logistical factors often mean that customers perceive, and react very differently to, the experiences of shopping on the web and in the

business's storefront(s), and this "perception gap" creates barriers to increased sales that might be removed with better integration of the business's online and offline presence. For instance, the prohibitive costs associated with maintaining physical inventory in multiple storefront locations prevents many retailers from providing many of their customers access to the full breadth of products they offer, and introduces the possibility that a customer could visit the store, find that an item is not stocked, and go to a competitor's store to buy the item. Also, a business's product line can be greatly affected by the cost of stocking certain products at stores – preventing some businesses from carrying certain slower-selling items, thereby costing them not only the sale of those items but sometimes others as well. For example, certain web-based operations that stock items at few locations, or do not stock certain items at all but merely forward orders to manufacturers or distributors to ship to customers, have come to fill a role that store-based retailers cannot perform economically, thus taking the revenue a store-based retailer might have gotten not only for that product, but for products the store-based retailer might have sold with it (and might, coincidentally, be stocked in the store). Lastly, until recently, most retailers were unable to accept returns of purchases made on their web sites at the store, which not only gave the customer cause to reconsider the purchase, but also required the business to absorb extra shipping costs to transfer the goods back to a central distribution center.

Recognizing the potential benefits, many businesses strive to meet the technological and logistical challenges associated with better integrating online and offline sales channels. However, achieving this goal remains elusive, and those who have come closest to achieving it still bear unnecessary costs as a result. Several retailers, for instance, offer customers the capability, if an item is out of stock, of having a salesperson access a back-office inventory and order-entry system directly from a cashier's register, so that the item can be ordered and shipped to the customer, and payment can be accepted in-store as though a "normal" purchase were being executed. This solution, however, requires that the retailer construct and maintain a customized interface to inventory systems as well as a facility to reconcile payment received in the store with products to be shipped. Further, given that the customer typically perceives the process as compensating for an under-stocked store, it does not allow retailers to minimize the cost of maintaining physical inventory without sacrificing customer satisfaction. At least one electronics retailer takes the additional step of allowing customers to access an "in-

store version” of the retailer’s web site (typically stored on the retailer’s intranet) from kiosks placed throughout the store, from which customers can initiate orders, and pay for those orders in the store. This solution, however, requires that the retailer construct and maintain a separate “in-store version” web site, and deploy separate infrastructure to support it.

### SUMMARY OF THE INVENTION

The foregoing and other disadvantages are addressed with a system having the ability to provide customers access to a publicly available (e.g., internet) web site and enable them to pay in the store for orders placed thereon. The system offers the potential to significantly decrease the cost of maintaining physical inventory, increase sales, and increase customer satisfaction, without requiring costs associated with building and maintaining either a custom interface to inventory systems or a separate version of the web site. Over time customers benefit as well, by having a greater breadth of products to choose from at the store, having greater flexibility in terms of payment method, and presumably enjoying lower prices, as businesses incur less overhead to maintain physical inventory and increase scale.

There are a number of aspects to the invention. According to one aspect, a computer-readable medium is provided with instructions recorded thereon, for causing at least one processor in communication with a web site to accept a data object from the web site describing an order, and transmit a notification, upon receipt of payment for the order, to initiate order fulfillment. This medium may also include instructions for accepting the data object through a communication channel and/ or across a network firewall. It may also include provisions for creating a self-contained module incorporating data and the processing to be performed on the data, and for loading this data to an electronic file storage.

According to another aspect, a computer-readable medium is provided with instructions recorded thereon for causing a computer in communication with a web site to accept a first data object from the web site describing an order requiring shipment, accept a second data object from a point-of-sale module indicating a payment having been received for the order, match the first and second objects according at least one data

element common to both objects, and transmit notification that a fulfillment operation is to commence. This computer-readable medium may also include instructions for the first object including accepting it through a communication channel and/ or across a network firewall, creating a self-contained module incorporating data and the processing to be performed on the data, and loading it to an electronic file storage. This computer-readable medium may also include instructions for the second object including accepting it through a communication channel and/ or across a network firewall, creating a self-contained module incorporating data and the processing to be performed on the data, and loading it to an electronic file storage.

According to still another aspect, a method is provided for executing a transaction comprising, from a location at a vendor's place of business, a user initiating, from a terminal, an order from a web site affiliated with the vendor; the vendor accepting payment from the user, at the place of business, in return for the order; and the vendor initiating shipment of the order to the customer, from a location separate from the place of business. This method may also include transmitting data describing the order from the web site to a computer operated by the vendor for point-of-sale processing, which may occur over a communication channel and/ or across a network firewall. The method may also provide for the vendor accepting payment by transmitting notification of received payment to a software module which performs fulfillment processing, which may also occur over a communication channel and/ or across a network firewall.

A still further aspect is a method is provided for executing a transaction initiated through a web site comprising accepting a first data object from the web site describing an order requiring shipment, accepting a second data object from a point-of-sale module indicating a payment having been received for the order, matching the first and second objects according at least one data element common to both objects, and transmitting notification that order fulfillment is to commence. This method may also include provisions for matching to be performed by at least one human operator.

Yet another aspect is a method is also provided for executing a transaction comprising a user initiating, from a terminal, an order from a web site affiliated with the vendor, and the vendor accepting payment from the user, at the place of business, in return for the order; and the vendor initiating shipment of the order to the customer, from a location separate from the place of business. This method may further provide for order initiation to occur at a location separate from the vendor's place of business.

Yet another aspect is a system for executing a transaction comprising means for a user to initiate from a terminal, from a location at a vendor's place of business, an order from a web site affiliated with the vendor, means for the vendor to accept payment from the user, at the place of business, in return for the order, and means for the vendor to initiate shipment of the order to the customer, from a location separate from the place of business. The system may further comprise means for transmitting data describing the order from the web site to a computer operated by the vendor for point-of-sale processing, means for receiving transmitted data over a communication channel, means for receiving transmitted data across a network firewall, means for transmitting notification of received payment to a software module which performs fulfillment processing, and/ or means for transmitting the notification over a communication channel.

Yet another aspect is a system for executing a transaction initiated through a web site comprising means for accepting a first data object from the web site describing an order requiring shipment, means for accepting a second data object from a point-of-sale module indicating a payment having been received for the order, means for matching the first and second objects according at least one data element common to both objects, and means for transmitting notification that order fulfillment is to commence. The system may further comprise means for matching to be performed by at least one human operator.

Yet another aspect is a system for executing a transaction comprising means for a user to initiate, from a terminal, an order from a web site affiliated with a vendor, means for the vendor to accept payment from the user, at the place of business, in return for the order, and means for the vendor to initiate shipment of the order to the customer, from a location separate from the place of business. The system may further comprise means for initiating the order at a location separate from the vendor's place of business.

The foregoing and other aspects and advantages of the invention will become more readily understood and evident from the detailed description, below, which should be read in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings,

Figure 3 is a flowchart depicting in-store processing for one method embodiment as taught herein.

Figure 5 is a flowchart depicting detailed match processing for some embodiments of systems and methods as taught herein.

The present invention, as defined in the claims, provides method and apparatus for enabling a customer of a business to pay for an internet purchase of goods or services at a physical “point of sale” location of the business (i.e., one of its stores), thereby allowing the business to be more selective about the inventory maintained in the store and creating an alternative sales channel, and allowing the customer greater flexibility in terms of payment options and access to a wider variety of products and services.

In Figure 1, blocks are used to represent functional entities, which may or may not be physically distinct (for instance, one computer processor could comprise several functional blocks, and one block may comprise a number of processors). Arcs are used to represent actions and data flow between blocks.

Referring to Figure 1, which depicts an illustrative embodiment of a system and the flow of information during the use thereof, utilizing the invention, the customer, or a store employee conferring with the customer, initiates an order indicated at arc 100 from Terminal 10, to Web Site 20. Terminal 10 may have any convenient form; for example, it may be a general-purpose computer, a kiosk which operates only to access a networked application, a personal digital assistant (PDA) or even a web-enabled cell phone, among various possibilities. Terminal 10 may achieve communication with Web Site 20 either via the internet, via a dedicated communications link, or other means. A customer using Terminal 10 may initiate access to Web Site 20 from within the place of business, or from outside the place of business, depending on the customer's wishes. The terminal

may run only a browser application, or other applications integrated with the browser. In the embodiment depicted, the terminal preferably is a kiosk located in the store and is able to access multiple networked applications using an interface (created by appropriate software) providing a standard "tool bar" metaphor well-appreciated by those skilled in the art. Terminal 10 establishes communication with the web site through any appropriate communication protocol such as TCP/IP, and achieves internet access via an industry-standard internet service provider (ISP). The order on the web site, in the embodiment shown, is executed via a series of standard HTTP GET requests. In other embodiments, other communications protocols and request methods might be employed.

Web Site 20 (in particular, Web Server 22) processes the HTTP GET requests initiated by Terminal 10. In the embodiment shown, Web Site 20 identifies the order as being placed from a terminal in the store. The identification of a store terminal may be IP-based (through either the identification of an individual IP address, or the routing of several terminal IP addresses through one or more common, or masked, IP addresses provided by the internet service provider), or cookie-based, or both. The web server application employed by the web site may utilize any industry-standard web server technology including Microsoft Windows NT, Microsoft IIS, the Apache Group's web server, and others.

Web Site 20 will serve content to the terminal specific to store-initiated transactions. In the embodiment depicted, this is accomplished by employing an application server 24, a content management system 26, and a database 28, as will be appreciated by those skilled in the art. However, this might also be done by providing content areas within Web Site 20's content layout specifically designed to facilitate store-based transactions.

In this embodiment, when the customer finalizes the order, a hard copy confirmation is preferably printed at the terminal, and data describing the order is transmitted in arc 110 to both Application Server 30 and Inventory & Financial Management System 90. These transmissions may preferably be accomplished via a communication channel and occur over network firewalls, as shown. The communication channel is akin to a pipe, with preferably defined starting and ending points at specific IP addresses, which may also be the single entry and exit points for data. The communication channel described herein may be constructed using commercially available messaging software, such as IBM's MQ series, or proprietary

messaging software, as appreciated by those skilled in the art. This messaging software may facilitate point-to-point data transfer using industry-standard communication hardware, which will also be appreciated by those skilled in the art.

The communication channel desirably has a security function, given the sensitivity of data generally being transmitted, and also provides for data persistence, given that the communication channel can be expected to fail over time. It preferably processes large volumes of data efficiently, is networking protocol-independent (i.e., support TCP/IP, FTP, SMTP and others), supports data transmission between heterogeneous computing platforms (e.g., from a UNIX to an NT environment), and transmits data regardless of its format (e.g., EBCDIC, ASCII, etc.). In the embodiment shown, the transfer of data in the channel is uni-directional, although the channel messaging software may support bi-directional data flow. In alternative embodiments the flow of data may be either uni-directional or bi-directional depending on system and security requirements. In the embodiment shown, no acknowledgement is given of data transmitted at the starting point, or received at the ending point, but in other embodiments, this acknowledgement may be required or, in any event, provided. Finally, the communication channel may transmit data on a synchronous or asynchronous basis. Depending on system requirements, the channel may possess any combination of the features described herein, but shall not be limited to a combination of the characteristics listed.

In the embodiment shown, Web Site 20 transmits data to Application Server 30 in arc 110 in text file ASCII format, representing the order placed on the web site. To accept this data via the communication channel and across the network firewall in the embodiment shown, Application Server 30 executes specific instructions enabling receipt of data via these means, as will be appreciated by those skilled in the art. Upon receipt, Application Server 30 parses this text file and creates a binary object which, in the embodiment shown, is a COM component. In this embodiment, the text file is converted into the binary object/COM component to conform with the object-oriented system design based on Microsoft's Component Object Model software architecture deployed, as will be well-understood by those skilled in the art. Those skilled in the art will also be able to suggest other modular and non-modular programming techniques, and other component architectures, which may be employed for order processing to achieve similar objectives in alternative embodiments. In this embodiment, the binary



object will be a self-contained module containing both the data and the processing to be performed on it.

In arc 120, this object is transferred from Application Server 30 to Point Of Sale Order Server 40 which, in the embodiment shown, is not physically located in the store.

5 In this embodiment, the Point Of Sale Order Server 40 contains a suitable database, such as an SQL-based database, for these objects. Other embodiments may employ alternative database technologies, or another form of electronic file storage altogether, and this electronic file storage may store data other than these objects. The database may perform validation on the objects to insure that order data conforms to predefined  
10 standards, and that data transfer has completed successfully.

Referring to Figure 2, which depicts a computer which might comprise Point Of Sale Order Server 40, data is accepted from Network 200 into Computer 100 via a network port comprising an Input/ Output Device 110. Data is then transferred to Memory 120 via Data Bus 140, where, in this embodiment, it will be at least partially  
15 loaded to Random Access Memory (RAM) 122 for processing by Central Processing Unit (CPU) 130, including processing required to load the data into a database stored in Disk(s) 124. CPU 130 may perform additional processing to validate the data either before or during its loading to the database. In other embodiments, data may remain in RAM 122, or may be stored in Disk(s) 124 in a non-database format, as dictated by  
20 system requirements.

Referring again to Figure 1, in this embodiment, as data transfer between Application Server 30 and the Point Of Sale Order Server 40 occurs, the customer, who has preferably printed out a hard copy paper confirmation of his or her web site order at the terminal, takes that confirmation to Register 50 within the store. (The customer may  
25 also take the confirmation to another store location, and may not require the paper confirmation to proceed with the transaction.) In this embodiment, the paper order confirmation contains an identification of the order object stored in Point Of Sale Order Server 40. That identification may, for example, be a numerical code or it may be a machine-readable code such as a bar code. When the store employee initiates a "pay at  
30 point of sale" transaction using a register key and inputs the identification of the order or scans the machine-readable (e.g., bar) code, a software module running on Register 50 initiates the extraction of the order object from Point Of Sale Server 40 in arc 130 for payment processing at Register 50. In other embodiments, Register 50 may execute only

a browser through which to execute the SQL database, or other techniques may be used to access order data stored on Point Of Sale Server 40 received from Web Site 20. In the embodiment shown, however, the interface running on the register will be a standard Visual C++ interface appreciated by those skilled in the art, albeit customized specifically for efficient access to the SQL database running on Point Of Sale Order Server 40. In other embodiments, alternative interfaces might be employed. There may also, of course, be multiple register clients throughout the store.

If the order is extracted successfully from Point Of Sale Server 40 at Register 50, the store employee and customer will complete the transaction by exchanging payment for the order placed. Payment may entail any consideration accepted by the seller, including legal tender, gift certificate, exchange of goods, and credit card payment, or a combination thereof. Once payment is received, the store employee operating the register indicates, as with any other transaction, that the transaction is complete, and the order transaction is updated to reflect payment receipt. If the order was not successfully extracted from Point Of Sale Server 40 at Register 50, in the embodiment shown, the cashier is prompted to manually input the order number printed on the confirmation from Web Site 20. In the embodiment shown, all transactions are stored on In-Store Server 60 in arc 140. In this embodiment, In-Store Server 60 may be a Microsoft Windows NT 4.0 server, although other server platforms may be employed.

Referring to Figure 3, which depicts data flow, retrieval, and storage during one embodiment of point-of-sale processing, data describing the customer's order is sent by Web Site 20, across Firewall 05 and via Channel 07, to Application Server 30, which receives the data in block 30A, reformats the data in block 30B, and transmits it to Point Of Sale Order Server 40. Point Of Sale Order Server receives the data in block 40A and loads it to Storage 45 in block 40B. Within Storage 45, which may represent a single storage device or several storage devices, data representing instructions on various processing steps, as well as orders themselves, is stored at memory addresses 1-9. These memory addresses are accessed by the components shown, as depicted, throughout point-of-sale processing. Register Processing, including payment receipt, is completed at block 50. Data representing the completed order resides in Storage 45 until its transmission by the In-Store Server in block 60. Depending on the embodiment, Storage 45 may comprise a single computer-readable medium resident in a single hardware component,

multiple computer-readable media resident in a single hardware component, or multiple computer-readable media resident in multiple hardware components.

Referring again to Figure 1, in arc 150, In-Store Server 60 transmits transaction data over a second communication channel to Corporate Integration Computer 70, which serves as a landing spot for the data until it is extracted by Matching Function 80. In this embodiment, In-Store Server 60 initiates the transmission on a real-time basis; in other embodiments Computer 70 may initiate an extraction from Server 60, and this may occur on a batch mode or real-time basis, using FTP or other file transfer software. In the embodiment shown, Corporate Integration Computer 70 may, for example, be an IBM AS/400 computer or the like, which may store transaction data in a DB2 (or other) database.

Matching Function 80 compares transaction data (received from Server 60 in arc 150) with the original order information (received from Web Site 20 as indicated by arc 110, via Inventory & Financial Management System 90 in arc 170). The Matching Function's purpose is to ensure that correct payment has been received for the order placed.

Referring to Figure 4, which depicts the processing flow inherent in Matching Function 80 in this embodiment, order data is transmitted to Corporate Integration Computer 70 in arc 150, where it will sit until Matching Function 80 initiates its extraction in arc 160. Similarly, order data is transmitted from Web Site 20 to Inventory & Financial Management System 90 in arc 110, where it will reside until Matching Function 80 initiates its extraction in arc 170. In this embodiment, these extractions in arcs 160 and 170 are accomplished using FTP, although in other embodiments, extraction might be accomplished using other file transfer applications. Matching Function 80 accepts this data and processes it using Matching Batch Processes 82.

Figure 5 depicts in detail a suitable matching process as may be used in this embodiment. In the embodiment shown, data objects representing both order transactions and payment transactions are extracted in 160A and 160B, though not necessarily respectively, over Firewall 05 and via Communications Channel 07. Data is loaded to Matching Process Storage 83 in block 82A. Within Storage 83, which may represent a single storage device or several storage devices, data representing instructions on various processing steps, as well as order and payment transactions, are stored at memory addresses 1-7. These memory addresses are accessed by the components shown, as

depicted, throughout match processing. Depending on the embodiment, Storage 83 may comprise a single computer-readable medium resident in a single hardware component, multiple computer-readable media resident in a single hardware component, or multiple computer-readable media resident in multiple hardware components.

5           Matching Process 82B then accesses payment and order transaction data residing in Storage 83, and attempts to match data based on elements explicitly common to both types of records. In alternative embodiments, Matching Process 82B may employ fuzzy logic, or other matching techniques, as required. In the embodiment shown, extraction and match processing occur in batch mode on a predetermined basis. In other  
10           embodiments, extraction and/ or processing may occur in real time. Also in the embodiment shown, if a match between a payment transaction record and an order transaction record is established by either Matching Batch Process 82B, a positive notification message is transmitted for the order to Inventory & Financial Management System 90 in 180, so that it can be fulfilled. If no match is found, a negative notification  
15           is transmitted to Inventory & Financial Management System 90, also in 180. In the embodiment shown, positive and negative notifications are transmitted on a predetermined schedule to Inventory & Financial Management System 90; in other embodiments, this transmission may occur in real-time, and negative notifications might not be transmitted at all.

20           Referring again to Figure 4, Matching Function 80, in the embodiment shown, also includes a facility for direct input by operators in Presentation Layer 84. In the embodiment shown, once Matching Batch Processes 82 completes its (automated) attempt to match payment transactions and order transactions, operators using Presentation Layer 84 may intervene in 85 to attempt to match unmatched records  
25           produced as output from Matching Batch Processes 82. Records might remain unmatched after Matching Batch Processes 82 due to data element mismatches or other causes. In 85, an operator may intervene to manually match records based on predefined business rules designed to identify matches not otherwise identified by automated processes. For example, if the price on a payment transaction does not match the price on  
30           an order transaction, but falls within a predefined tolerance level, the operator may release the order to be shipped.

          Matching Database 82 may comprise a commercially available database or other electronic file storage to store data pertinent to the purchase, such as payment plans, tax

schedules, or other data specific to particular transactions not stored within In-Store Server 60. This feature (82) removes the need for data storage within individual stores, and also enables data sharing across stores, thereby facilitating easier store-to-store transfers or returns. In other embodiments, however, this data may be maintained at each  
5 store location.

In the embodiment shown, Matching Process 80 also includes a facility allowing direct access to order data by store employees at remote locations. Using Direct Access Terminal 55, store employees may determine the terms under which an order was originally placed, so that, for instance, a store employee can see the tax that was paid for  
10 an order. Store employees accomplish this by initiating Order Query 56 to Matching Process Presentation Layer 84, which in turn provides access to Order Database 82. The Original Order Terms 58 are then returned to Direct Access Terminal 55 for viewing by the store employee. In the embodiment shown, communications between Direct Access Terminal 55 and Matching Process 80 are accomplished using Wide Area Network  
15 (WAN) technology, as will be appreciated by those skilled in the art. In other embodiments, communications may be established using a dial-up connection or other means.

Referring again to Figure 1, in alternative embodiments, the information flow described in the foregoing may be accomplished with different combinations of hardware and software. For instance, in one possible alternative embodiment, components 30, 40,  
20 50, and 60 may comprise separate applications running on one computer. In another possible embodiment, each of these components may be distributed or replicated across many computers (for instance, Application Server 30 functionality might execute simultaneously on multiple pieces of hardware, and may or may not function as a single  
25 collective processor, depending on the volume of order data to be processed or the response time desired. To fulfill the requirements of the embodiment depicted in Figure 1, each hardware component might receive order data from Web Site 20 through separate, distinct communications hardware, or communications might be routed through a single hardware component for dissemination to all others.) Likewise, in other  
30 embodiments, components 70, 80, and 90 may also execute as separate applications on one computer, or each may be distributed across numerous hardware components.

In still other embodiments, hardware and software components in addition to those shown may also impose a security function on the system overall. Through the

security function, transmitted data at any point shown in Figure 1 may be encrypted or otherwise altered in order to prevent outside access. Additionally, while Figure 1 depicts only one firewall, multiple firewalls may be employed to restrict communications between corporate systems, store systems, the web site, or any combination thereof. In particular, in many embodiments, a second firewall will be employed between components maintained at the physical store location (like components 50 and 60) and so-called "corporate applications" like those shown in boxes 30, 40, 70, 80 and 90. These firewalls may be maintained and operated either by the business or its internet service provider(s).

The functionality described herein typically is provided with computer program instructions stored on one or more computer-readable media. Such media may include, without limitation, read-only memory, random access memory, magnetic storage and optical storage, variations of the foregoing and any combination thereof, as depicted with Memory 120 in Figure 2. When such instructions are executed by appropriate computers, such as the terminals and servers described above, these computers act as described.

While the invention has been particularly shown and described with reference to specific embodiments, these embodiments are presented by way of example only, as it is not possible to enumerate all potential implementations. It should be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention, which is defined in the following claims.

What is claimed is: